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BEFORE THE ARIZONA CORPORATION COMMISSION

LEA MÁRQUEZ PETERSON
Chairwoman
SANDRA D. KENNEDY
Commissioner
JUSTIN OLSON
Commissioner
ANNA TOVAR
Commissioner
JIM O'CONNOR
Commissioner

Arizona Corporation Commission

DOCKETED

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IN THE MATTER OF THE APPLICATION
OF TUCSON ELECTRIC POWER
COMPANY FOR APPROVAL OF ITS
DISTRIBUTED GENERATION
INTERCONNECTION MANUAL.

DOCKET NO. E-01933A-20-0116

Decision No. 78496

ORDER

Open Meeting
February 8 and 9, 2022
Phoenix, Arizona

BY THE COMMISSION:

FINDINGS OF FACT

1. Tucson Electric Power Company ("TEP" or "Company") is certified to provide electric service as a public service corporation in the State of Arizona.

2. In Decision No. 77437 (Docket No. RE-00000A-07-0609), the Arizona Corporation Commission ("ACC" or "Commission") adopted the text set forth in Arizona Administrative Code ("A.A.C.") Title 14, Chapter 2, Article 26 in the Notice of Supplemental Proposed Rulemaking relating to the Interconnection of Distributed Generation ("DG") Facilities and directed the Commission's Utilities Division/Legal Division to prepare and file a Notice of Final Rulemaking package with the Office of the Attorney General for review and approval under Arizona Revised Statutes ("A.R.S.") § 41-1044. The Interconnection of DG Facilities rules ("Interconnection Rules" or "Rules") were incorporated into the A.A.C. as a new Article 26, with an effective date of February 25, 2020.

1 3. A.A.C. R14-2-2628(A) states:

2 “No later than 90 calendar days after the effective date of this Article, each
3 Utility shall file with Docket Control, for Commission review and approval,
4 an Interconnection Manual that:

- 5 i. Contains detailed technical, safety, and protection requirements
6 necessary to interconnect a Generating Facility to the Distribution
7 System in compliance with this Article and Good Utility Practice; and
8 ii. Specifies by date, either within its main text or in an appendix, the
9 version of each standard, code, or guideline with which an Applicant’s
10 Generating Facility must comply to be eligible for Interconnection
11 and Parallel Operation.”

12 4. On May 4, 2020, TEP filed a request for a 60-day extension of the May 25, 2020,
13 deadline to file its Interconnection Manual (“Manual”) pursuant to A.A.C R14-2-2628(A).

14 5. On June 30, 2020, the Commission issued Decision No. 77652, which approved
15 TEP’s request for an extension of time and ordered TEP to file its Manual for Commission review
16 and approval by July 24, 2020. On July 24, 2020, TEP filed its Manual.

17 6. On August 19, 2020, Arizona Solar Energy Industries Association (“AriSEIA”) filed
18 comments to TEP’s Manual. AriSEIA stated that TEP is violating the Commission’s
19 interconnection rules and causing installers and customers to waste time and money on solar projects
20 which are being rejected for reasons not permitted in the rules. AriSEIA specifically stated that TEP
21 is not following Screen A under A.A.C. R14-2-2615(A) (“Screen A”). AriSEIA stated that TEP
22 does not consider the circuit hosting capacity as Screen A requires and applies its own review criteria
23 which indicates 100 percent of feeder minimum daytime load as a proxy for measuring feeder circuit
24 hosting capacity. In addition, AriSEIA indicated that this method or criteria does not reflect the
25 accurate limit of the circuit’s hosting capacity. AriSEIA stated that TEP’s process is also causing
26 financial losses to customers since TEP only informs customers that they are failing TEP’s
27 interpretation of Screen A after time and money has already been invested.

28

1 7. AriSEIA recommended that TEP conduct a hosting capacity study to comply with
2 Screen A and make the results available to installers and the public because AriSEIA believes that
3 the information is critical to make informed decisions.

4 8. On August 24, 2020, TEP responded to AriSEIA's comments. The Company
5 confirmed that under Screen A it is required to determine whether the proposed system exceeds 100
6 percent of the minimum daytime load of the circuit. In addition, TEP indicated that applying this
7 analysis does not violate the Rules because the Company already provides for this analysis in the
8 Supplemental Review process. TEP also stated that the Rules purposefully do not provide a
9 definition of "hosting capacity" resulting in flexibility being provided to utilities to consider the
10 unique design and capabilities of their distribution systems and to identify safety and reliability
11 concerns. The Company also stated that performing hosting capacity studies are not expressly
12 required by the Rules, and there has been a need to conduct such studies in the past. TEP noted that
13 the Federal Energy Regulatory Commission ("FERC") utilizes a similar method in conducting a
14 supplemental review of small generators, i.e., less than 20 megawatts ("MW"). The FERC method
15 includes examining 100 percent of the minimum daytime load of the circuit in determining its
16 hosting capacity. If a customer does not pass Screen A, the customer is not prevented from installing
17 a system, and TEP will find other ways to help customers achieve their green energy objectives. The
18 Company also confirmed that a hosting capacity study has been launched, but will take many months
19 to complete.

20 9. On January 8, 2021, Tesla, Inc. ("Tesla") filed comments regarding TEP's
21 Manual. Tesla proposed the following addition as a new Section 9.2.1(i):

22 "A customer-owned meter collar for the purpose of interconnecting power
23 production sources or whole home electric isolation, shall be allowed where
24 that device does not impede access to the sealed meter socket compartment
25 or pull section of the SES. The meter collar shall be UL 414 Certified and
26 rated adequately for the connected equipment."

27 . . .

28 . . .

1 10. Tesla proposed that the diagrams be updated to clearly permit the use of meter socket
2 adapters (“MSAs”). Tesla stated that the use of the imported criteria into Screen A is not part of the
3 screen and is incorrect. The use of this incorrect criteria is causing six percent of all applications to
4 fail TEP’s version of Screen A. Tesla recognized that TEP admitted to the improper application of
5 the Interconnection Rules. Tesla noted that TEP’s incorrect and imported criteria comes directly
6 from the Supplemental Review process presented in R14-2-2620(E)(1)(a). The Rules permit the
7 Supplemental Review if the Applicant requests Supplemental Review after failing Screen A, E, or
8 F. In addition, Tesla stated that there is no basis in the Rules to justify the prohibition of backfeeding
9 energy to the grid by customers who charge their battery with grid-generated energy. Furthermore,
10 Tesla stated that TEP prohibits using batteries for backup power.

11 11. Tesla recommended that the Company apply the 15 percent of peak load screen as
12 intended as an initial review, and 100 percent of minimum load as supplemental. Tesla also
13 recommended that TEP remove the prohibition on backfeeding grid-supplied energy and the
14 prohibition on using batteries for backup power.

15 12. On February 1, 2021, TEP filed a letter to supplement information filed on August
16 24, 2020. In that filing, The Company stated that it would perform a hosting capacity study and
17 would provide a report to Commission Staff when completed. TEP initially identified 16 feeder
18 circuits where there were occurrences of DG serving the load of the entire circuit under minimum
19 load situations, which will result in substation backfeeding issues. These issues can cause safety
20 and reliability concerns. Additionally, backfeeding on a circuit can lead to islanded operation where
21 TEP is no longer able to regulate voltage to customers on that circuit and can lead to additional
22 safety and reliability issues. The Company is investigating system upgrades to resolve regarding
23 hosting capacity limits and has contracted with an outside engineering firm to complete hosting
24 studies on additional feeders. TEP is acquiring hosting capacity analysis software from the Electric
25 Power Research Institute (“EPRI”). Also, TEP stated it is making constructive progress on assessing
26 and addressing the ability to accommodate additional DG installations.

27 13. On October 1, 2021, TEP responded addressing Tesla’s and AriSEIA’s comments.
28 The Company stated that in the past it used a specific meter collar adapter called ConnectDER. In

1 2017, a technician experienced safety issues while working on a customer's meter that was
2 connected to a MSA resulting in damages to the customer's service panel due to an arc flash that
3 could have caused serious injury. TEP indicated that it is aware of only three states in the United
4 States that allow the use of MSAs with extensive limitations, including MSA type and discrete DG
5 system configuration requirements.

6 14. Despite past events, TEP noted it is willing to explore a program for MSAs where
7 MSAs are procured and installed by TEP, due to safety risks and concerns, at the customer's request
8 and cost. However, TEP would require a trial period of no less than six months to secure, test, and
9 select the appropriate adapters and determine how to change operations accordingly. The Company
10 would not install any MSA on a customer's panel during the trial period.

11 15. On October 4, 2021, TEP filed a revised Manual.

12 16. On October 12, 2021, Tesla filed a response to TEP's revised Manual. Tesla stated
13 that TEP's proposal regarding the use of MSAs is unreasonable. Tesla asked the Commission to
14 reject TEP's proposal as it relates to the MSAs and adopt Tesla's recommendations as detailed in its
15 January 8, 2021, filing.

16 **STAFF ANALYSIS AND RECOMMENDATIONS**

17 *Screen A*

18 A.A.C. R14-2-2615(A) states:

19 "For Interconnection of a proposed Generating Facility to a distribution
20 circuit, the aggregated generation on the circuit, including the proposed
21 Generating Facility, shall not exceed 15 percent of the total circuit annual
22 peak load as most recently measured at the substation or on the line section
23 (if available), or the circuit hosting capacity limit; whichever is greater.
24 Non-Exporting Systems, regardless of system size, and Inadvertent Export
25 systems with a Maximum Capacity of 20 kW and under shall not be subject
26 to this subsection."

27 The term "hosting capacity limit" is not a defined term in the Rules. The National Renewable
28 Energy Laboratory ("NREL") states that a dynamic hosting capacity analysis can help understand

1 the thresholds at which new distributed photovoltaic systems will trigger upgrades to the electrical
2 distribution system.¹ Furthermore, NREL states that the hosting capacity of a given feeder cannot
3 be represented by a single number, but rather the point beyond which upgrades, or control changes
4 may be needed. Staff believes the Interconnection Rules provide utilities flexibility in developing
5 hosting capacity analyses and identifying feeder specific hosting capacity limits. TEP shared results
6 of a feeder specific analysis which informed its ability to accommodate additional interconnections.

7 Staff has reviewed the filings made by AriSEIA, Tesla, and TEP as it relates to Screen A.
8 Based on this review, Staff concludes TEP is complying with the requirements of A.A.C. R14-2-
9 2615(A).

10 *Meter Socket Adapter*

11 According to United States Patent No. US9772347B2:²

12 “A distribution panel is the hub where an electrical power feed is divided
13 into subsidiary circuits. Typically, distribution panels of different capacities
14 (e.g., 150-Amp, 200-Amp, or 400-Amp) are installed to homes depending
15 on their electrical usage needs. Power carried by the electrical power feed
16 is distributed to the loads via the distribution panel. Therefore, an increased
17 load that results in more electrical current flowing through the distribution
18 panel may require changing an existing distribution panel to accommodate
19 the current change (increase). Furthermore, with the emergence of
20 renewable energy sources, a user that traditionally consumes electrical
21 power may provide electrical power into a distribution grid at certain times.
22 The additional circuit capacity required to accommodate this back feed of
23 energy may exceed the current capacity of an existing distribution panel,
24 requiring the existing distribution panel to be changed.

25 In many cases, there is no physical room in the distribution panel for more
26 circuits. A distribution panel is usually limited to a certain amount of

27
28 ¹ <https://www.nrel.gov/docs/fy19osti/74383.pdf>

² <https://patents.google.com/patent/US9772347B2/en>

electrical circuits. New circuits may be added if there are unused breaker locations in the existing distribution panel; otherwise, the existing distribution panel needs to be replaced by a distribution panel with a larger capacity.

An interconnection meter socket adapter comprises a housing enclosing a set of electrical connections. The interconnection meter socket adapter may be configured to be coupled to a standard distribution panel and a standard electric meter, thereby establishing connections between a distribution panel and a user such that electrical power may be delivered to the user while an electrical meter measures the power consumption of the user. An interconnection meter socket adapter may be configured to be coupled to a DC-AC inverter, which may be coupled to various energy sources. As such, the energy sources are coupled to an electrical power system. In addition, a connector such as a flexible cable or flexible conduit containing insulated wires can be provided for connecting various energy sources and/or sinks.”

Staff reviewed the use of MSAs for the interconnection of DG in other jurisdictions. Table 1 shows the results of this research. Staff reached out to each Public Utility Commission (“PUC”) that is the regulating authority for the utilities listed in Table 1 to ask whether a PUC rule existed that explicitly requires and/or allows for the use of MSAs.

Table 1. Review of MSA Use by Other Utilities

Utility		State	Staff Contact PUC?	MSA Authorized by Commission Rule?	MSA Allowed Per Utility Requirements?
1	Green Mountain Power (GMP)	Vermont	YES	NO	YES
2	Rocky Mountain Power (RMP)	Utah	YES	NO	YES
3	Jacksonville Electric Authority (JEA)	Florida	YES	NO	YES
4	PPL Electric Utilities (PPL)	Pennsylvania	YES	NO	YES

5	Hawaii Electric (HECO)	Hawaii	YES	NO	YES
6	NV Energy	Nevada	YES	NO	YES
7	Bluebonnet Electric Coop (only the Tesla Backup Switch at this time)	Texas	YES	NO	YES
8	Fort Collins Light and Power (only the Tesla Backup Switch at this time)	Colorado	YES	NO	YES
9	Pacific Gas & Electric	California	YES	NO	YES
10	Southern California Edison	California	YES	NO	YES
11	San Diego Gas and Electric	California	YES	NO	YES
12	ConEd	New York	YES	NO	YES
13	TECO (Tampa Electric)	Florida	YES	NO	YES
14	Florida Power and Light	Florida	YES	NO	YES

Based on this review, Staff confirmed that each utility listed in Table 1 allows the use of MSAs, but the requirements of the specific use case are communicated by the utilities in various formats. For example, many of the requirements are contained within a utility's Electric Service Requirements manual. In addition, based on a cursory review and feedback received from other PUCs, it does not appear that the use of the MSA is specified by a PUC rule.

San Diego Gas and Electric ("SDGE") is one utility that allows for the use of MSAs and states it can "simplify the interconnection process" and "without the need for costly, labor-intensive upgrades."³ In addition, SDGE states that, "before installing rooftop solar panels, many residential customers will be required to make expensive upgrades to their electrical service panel.

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³ San Diego Gas and Electric:

<https://www.sdge.com/residential/savings-center/solar-power-renewable-energy/renewable-meter-adapter>

1 These upgrades usually introduce delays and additional permitting requirements.”⁴ Further,
2 SDGE advertises the following benefits of using MSAs:

- 3 • Eliminates many electrical upgrades, which may save time and money
- 4 • Installation can take as little as one hour
- 5 • Reduces the hassles involved in panel upgrade
- 6 • No impact to the customer’s property, like stucco repair, landscaping or painting
- 7 • Saves space in the customer’s service panel for future needs
- 8 • No need to enter the service panel, enabling a safer interconnection

9 Pacific Gas and Electric Company (“PG&E”) also states it has made available the MSA to
10 “simplify the process for qualified residential customers installing generating facilities” and the
11 MSA is “an alternative to upgrading an electric panel and service which may save time and
12 additional cost.”⁵ Staff observes that PG&E’s requirements state “the review and approval [of
13 MSAs] is at the discretion of the PG&E Meter Engineering and Field Metering personnel.”⁵

14 Staff reviewed Tesla’s proposed language contained in its January 8, 2021, filing which
15 states:

16 “A customer-owned meter collar for the purpose of interconnecting power
17 production sources or whole home electric isolation, shall be allowed where
18 that device does not impede access to the sealed meter socket compartment
19 or pull section of the SES. The meter collar shall be UL 414 Certified and
20 rated adequately for the connected equipment.”

21 Based on its review of this language, the Commission supports its implementation and orders
22 it be added as Section 9.2.1 (i) in the Manual. This language provides a clear standard by which to
23 judge the meter socket adapter technology and permits TEP customers to benefit from safe
24 technology that is proven to reduce the time and costs associated with adopting solar and battery

26 ⁴https://marwellcorp.com/wp-content/files/RMA_COMBO_FLYER_6-21-16.pdf

27 ⁵ Pacific Gas and Electric’s Electric and Gas Service Requirements:
28 https://www.pge.com/pge_global/common/pdfs/services/building-and-renovation/greenbook-manual-online/TD-7001B-007.pdf

1 storage technologies. Further, to support and clarify the use of the beneficial MSA technology, the
2 Manual should be further amended to include the following reference to and description of
3 “Interconnection System Equipment” in Section 9.3:

4 “Interconnection equipment such as a customer-owned meter collar of the
5 purpose of interconnecting power production or whole home electric
6 isolation and (intentional or unintentional) islanding of a Generating
7 Facility shall be allowed where that device does not impede access to the
8 sealed meter socket compartment or pull section of the Sealed Electric
9 Section (SES). The meter collar shall be UL 414 Certified and rated
10 adequately for the connected equipment.”

11 Within 10 days of the effective date of this Decision, any interested party may submit to
12 TEP, a list of any MSAs that it believes should be approved by TEP for use. Within 30 days of the
13 effective date of this decision, TEP will develop a list of MSAs that it has approved for use and
14 submit it to the Commission for approval in order for the Commission to decide whether to
15 approve modification of TEP’s interconnection manual to limit the use of MSAs to those approved
16 by the Commission.

17 *Other Issues*

18 Based upon a review of TEP’s Manual and the filings made by AriSEIA and Tesla, Staff
19 provided TEP with commentary to help better align the text of the Manual with the provisions of the
20 Rules. Specifically, the notes listed in Appendix B that limited backfeeding of energy storage
21 systems were removed. In addition, Staff requested additional references to the procedural process
22 be included in TEP’s Manual. TEP filed a revised Manual for Commission review and approval on
23 October 4, 2021.

24 The Manual allows TEP to cancel an interconnection agreement if construction of a
25 Generating Facility is not completed within 180 days. Often large or even small construction
26 projects can take longer than this time and delays on construction projects are not uncommon. Under
27 the Rules, the utility may issue extensions of an interconnection agreement, but also may cancel the
28 agreement if there are delays. Upon cancellation, any investment the customer has made toward the

1 installation of the Generating Facility would be forfeited. We believe customers deserve protection
2 from these risks when they have been acting in good faith to complete the project. TEP should
3 approve extensions if the customer can demonstrate that permits have been acquired, equipment has
4 been purchased, construction has commenced, or any additional funds in reliance on the
5 interconnection agreement have been spent.

6 We also find that the Manual requires revision to better comply with the spirit, intent, and
7 text of the rules. Specifically,

- 8 1. The Manual should be revised to better preserve the Super Fast Track and Fast Track
9 designations recognized in the Rules. TEP is directed to pay attention to systems that
10 qualify for these faster review tracks as well as Inadvertent Export and Non-
11 Exporting systems to remove restrictions and burdens from these systems.
- 12 2. The Manual should be revised to require TEP to address concerns over high deposit
13 requirements and a lack of adequate documentation to support charges to customers
14 for utility-supplied interconnection equipment.
- 15 3. The Manual should be revised to not prematurely require inverters to comply with
16 IEEE sections that are not yet developed or of which equipment is not yet capable of
17 compliance.
- 18 4. The Manual should be revised to modify TEP's requirements around transfer trip
19 infrastructure, so as to not be overly burdensome, thereby saving hundreds of
20 thousands of dollars for large installations such as those going onto schools.

21 TEP is directed to submit a revised Manual that includes the specific changes identified
22 above and proposes language to deal with the issues raised in this section within 30 days of the date
23 of this Decision. Staff is then directed to issue a revised order within 60 days for the Commission's
24 consideration.

25 *Revised Manual*

26 TEP's revised Manual contains 15 sections and three appendices and is organized as follows:
27 (1) Introduction, (2) Scope, (3) Applicability, (4) Definitions, (5) Applicable Standards, (6)
28 Generator Facility Parallel Operation Modes, (7) Generator Types and Size Classes, (8) Application

1 Review Considerations, (9) Interconnection Technical Requirements, (10) DG Metering
2 Requirements, (11) Advanced Grid Support Features, (12) Testing and Start-up Requirements, (13)
3 Operating and Maintenance Requirements, (14) Requirements for Momentary Parallel Closed
4 Transition Switching of Backup Generators, (15) Interconnection Studies and Drawing Review,
5 (Appendix A) Application Process Flow Charts, (Appendix B) Sample Single-Phase Solar PV
6 Interconnection Diagrams, and (Appendix C) Energy Storage Configuration Diagrams.

7 Staff has reviewed TEP's revised Manual and concludes it satisfies the requirements
8 contained in the Commission's Interconnection Rules. Staff recommends the Commission approve
9 TEP's revised Interconnection Manual, filed on October 4, 2021.

10 CONCLUSIONS OF LAW

11 1. Tucson Electric Power Company is a public service corporation within the meaning
12 of Article XV, Section 2 of the Arizona Constitution.

13 2. The Commission has jurisdiction over Tucson Electric Power Company and the
14 subject matter of the application.

15 3. The Commission, having reviewed the application and Staff's memorandum dated
16 January 25, 2022, concludes that it is in the public interest to approve Tucson Electric Power
17 Company's Revised Interconnection Manual filed October 4, 2021, pursuant to A.A.C. R14-2-
18 2628(A).

19 ORDER

20 IT IS THEREFORE ORDERED that Tucson Electric Power Company's Revised
21 Interconnection Manual, filed on October 4, 2021, is approved as modified herein.

22 IT IS THEREFORE ORDERED that Tucson Electric Power Company shall amend its
23 Revised Interconnection Manual to facilitate the utilization of MSAs as set forth herein.

24 IT IS THEREFORE ORDERED that Tucson Electric Power Company shall notify the
25 Commission immediately if it encounters any safety concerns associated with MSAs, including
26 impacts to public health, safety, and reliability, so the Commission can take appropriate action.

27 IT IS THEREFORE ORDERED that Tucson Electric Power Company shall file in this
28 docket an annual report by December 31st of 2022, 2023, and 2024, identifying how many adaptors

1 were deployed in its service territory during the previous calendar year.

2 IT IS THEREFORE ORDERED that Tucson Electric Power Company shall file an
3 application containing the results of the MSA trial program, with Docket Control, within 90 days of
4 the MSA program's conclusion. The application shall include details on the programs effect on
5 public health and safety and reliability.

6 IT IS FUTHER ORDERED that within 10 days of the effective date of this Decision, any
7 interested party may submit to TEP a list of any MSAs that it believes should be approved by Tucson
8 Electric Power Company for use.

9 IT IS FUTHER ORDERED that Tucson Electric Power Company shall develop a list of
10 MSAs that is has approved for use and submit it to the Commission, within 30 days of the effective
11 date of this Decision, for approval in order for the Commission to decide whether to approve
12 modification of TEP's interconnection manual to limit the use of MSAs to those approved by the
13 Commission.

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IT IS FURTHER ORDERED that this Decision shall become effective immediately.

BY THE ORDER OF THE ARIZONA CORPORATION COMMISSION


CHAIRWOMAN MARQUEZ PETERSON


COMMISSIONER KENNEDY

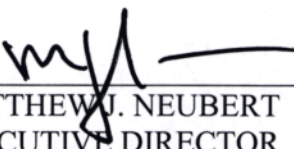

COMMISSIONER OLSON


COMMISSIONER TOVAR


COMMISSIONER O'CONNOR



IN WITNESS WHEREOF, I, MATTHEW J. NEUBERT,
Executive Director of the Arizona Corporation Commission,
have hereunto, set my hand and caused the official seal of this
Commission to be affixed at the Capitol in the City of
Phoenix, this 2 day of March, 2022.


MATTHEW J. NEUBERT
EXECUTIVE DIRECTOR

DISSENT: _____

DISSENT: _____

EOA:SA:jn/SJE

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2 Docket No. E-01933A-20-0116

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